FAA–STD–029C
October 5, 1993

U.S. Department
of Transportation
**Federal Aviation
Administration**

U.S. Department of Transportation

Federal Aviation Administration

Standard

SELECTION AND IMPLEMENTATION OF TELECOMMUNICATIONS STANDARDS

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DOCUMENT CHANGE NOTICE

1. Originator Name and Address	2.	3. Code Identification	4. Standard No.
SEIC Washington, DC	[ ] Proposed [X] Approved	N/A	FAA-STD-029C
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Selection and Implementation of Telecommunications Standards, FAA-STD-029C	N/A

This notice informs recipients that the standard identified by the number (and revision letter) shown in block 4 has been changed. The pages changed by this DCN (being those furnished herewithin) carry the same date as the DCN. The page numbers and dates listed below in the summary of changed pages, combined with nonlisted pages of the original issue of the revision shown in block 4, constitute the current version of this specification.

13. DCN No.	14. Pages changed	S*	A/D*	15. Date
1	This change incorporates the following NCP: 16091. This NCP supercedes FAA-STD-029B in its entirety	S		10/5/93

*S = Indicates Supercedes Earlier Pages *A = Indicates Added Page * D = Indicates Deleted Page

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FOREWORD

This document lists the telecommunications (voice and data) standards for use by the Federal Aviation Administration (FAA) in the acquisition of new telecommunications equipment/systems. This standard also serves as a reference document for the FAA telecommunications program but is not intended to be a referenced document in a procurement package.

The selection of the appropriate standards referenced within this document for inclusion in specific procurement packages is to be accomplished in the following manner:

a. Identify the telecommunications interfaces addressed within the procurement action and the existing telecommunications interfaces that are impacted by the procurement.

b. Consult FAA–STD–029, section 3, and identify, within the constraints imposed by the existing equipment, the appropriate applicable standards. Where clarification is necessary, selection and application criteria are contained in Appendix I.

c. Examine in detail each potentially appropriate standard and select the ones that best define the interface requirements.

d. Extract the appropriate technical requirements portion of the solicitation wording for inclusion in the procurement package.

Care should be taken to ensure that the telecommunications interfaces defined by the standards listed in FAA–STD–029 are compatible with existing interfaces.

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APPENDIX II

1. SCOPE

1.1 Scope. This document provides telecommunications standards to be used by the Federal Aviation Administration (FAA) in the preparation of specifications and related procurement documents for the lease or purchase of telecommunications systems, services, or equipment.

1.2 Purpose. This document is to be used by FAA personnel in the selection of telecommunications standards for FAA use. This standard will not be a referenced document in a procurement request package.

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2. APPLICABLE DOCUMENTS

2.1 Government documents. The following documents of the issue in effect on the date of invitation for bids or request for proposal, form a part of the standard to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this standard, the contents of the referenced document shall be considered the superseding requirement.

STANDARDS:

FAA

FAA–STD–039	National Airspace System (NAS) Open Systems Architecture and Protocols

Federal

FED–STD–1002	Time and Frequency Reference Information in Telecommunication Systems
FED–STD–1005	Coding and Modulation Requirements for 2400 Bit/Second Modems
FED–STD–1006	Coding and Modulation Requirements for 4800 Bit/Second Modems
FED–STD–1007	Coding and Modulation Requirements for Duplex 9600 Bit/Second Modems
FED–STD–1008	Coding and Modulation Requirements for Duplex 600 And 1200 Bit/Second Modems
FED–STD–1010/ FIPS PUB 16–1	Bit Sequencing of the American National Standard Code for Information Interchange in Serial–By–Bit Data Transmission
FED–STD–1011/ FIPS PUB 17–1	Character Structure and Character Parity Sense for Serial–By–Bit Data Communication in the Code for Information Interchange
FED–STD–1012/ FIPS PUB 18–1	Character Structure and Character Parity Sense for Parallel–by–Bit Data Communication in the American National Standard Code for Information Interchange
FED–STD–1013/ FIPS PUB 22–1	Synchronous Signaling Rates Between Data Terminal Equipment and Data Circuit–Terminating Equipment Utilizing 4kHz Circuits

FED–STD–1015	Analog to Digital Conversion of Voice by 2,400 Bit/Second Linear Predictive Coding
FED–STD–1020	Electrical Characteristics Of Balanced Voltage Digital Interface Circuits
FED–STD–1026	Interoperability and Security Requirements For Use of the Data Encryption Standard in the Physical Layer of Data Communications
FED–STD–1027	General Security Requirements for Equipment Using the Data Encryption Standard
FED–STD–1028	Interoperability and Security Requirements for Use of the Data Encryption Standard with CCITT Group 3 Facsimile Equipment
FED–STD–1030	Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits
FED–STD–1032/ FIPS PUB 154	High Speed 25–Position Interface for Data Terminal Equipment And Data Circuit–terminating Equipment.
FED–STD–1033	Data Communications Systems and Service–User Oriented Performance Parameters
FED–STD–1037	Glossary of Telecommunications Terms
FED–STD–1061	Group 2 Facsimile Apparatus for Document Transmission
FED–STD–1062	Group 3 Facsimile Apparatus for Document Transmission
FED–STD–1063	Procedures for Document Facsimile Transmission

National Institute for Standards and Technology (NIST)

FIPS PUB 1–2	Code for Information Interchange, its Representations, Subsets, and Extensions
FIPS PUB 2–1	Perforated Tape Code for Information Interchange
FIPS PUB 3–1	Recorded Magnetic Tape for Information Interchange (800 CPI, NRZI)
FIPS PUB 16–1/ FED–STD–1010	Bit Sequencing of the Code for Information Interchange in Serial–by–Bit Data Transmission
FIPS PUB 17–1/ FED–STD–1011	Character Structure and Character Parity Sense for Serial–by–Bit Data Communication in the Code for Information Interchange

FIPS PUB 18–1/ FED–STD–1012	Character Structure and Character Parity Sense for Parallel–by–Bit Data Communication in the Code for Information Interchange
FIPS PUB 22–1/ FED–STD–1013	Synchronous Signaling Rates Between Data Terminal and Data Communication Equipment
FIPS PUB 25	Recorded Magnetic Tape for Information Interchange (1600 CPI, Phase Encoded)
FIPS PUB 46	Data Encryption Standard
FIPS PUB 50	Recorded Magnetic Tape for Information Interchange, 6250 CPI (246 cpmm), Group Coded Recording
FIPS PUB 52	Recorded Magnetic Tape Cartridge for Information Interchange, 14 Track, 6.30 mm (1/4 inch), 63 bpmm (1600 bpi) Phase Encoded
FIPS PUB 53	Transmittal Form for Computer Magnetic Tape File Properties
FIPS PUB 58–1	Representation of Local Time of the Day for Information Interchange
FIPS PUB 59	Representation of Universal Time, Local Time Differentials and United States Time Zone References for Information Interchange
FIPS PUB 79	Magnetic Tape Labels and File Structure for Information Interchange
FIPS PUB 81	Data Encryption Standard (DES) Modes of Operations
FIPS PUB 86	Additional Controls for Use with American National Standard Code for Information Interchange
FIPS PUB 107	Local Area Networks: Baseband Carrier Sense Multiple Access with Collision Detection Access Method and Physical Layer Specifications and Link Layer Protocol
FIPS PUB 146–1	Government Open Systems Interconnection Profile (GOSIP)
FIPS PUB 154/ FED–STD–1032	Government Open Systems Interconnections Profile

General Services Administration

Form SF–277	Physical Properties and Characteristics of Recorded Tape Files

National Communications Security Committee

NCSC–11	National Policy for Protection of Telecommunications Systems Handling Unclassified National Security Information

Federal Communications Commission (FCC)

FCC Rules and Regulations, Part 68	Connection of Terminal Equipment to the Telephone Network

Copies of specifications, standards, drawings, and publications required by suppliers in connection with specified procurement functions should be obtained from the procuring activity or as directed by the contracting officer.

2.2 Non–Government documents. The following documents form a part of the standard to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this standard, the contents of the referenced document shall be considered the superseding requirement.

STANDARDS:

Bellcore (Bell Communications Research) Publications

PUB 41008	Transmission Parameters Affecting Voiceband Data Transmission Description of Parameters
PUB 43004	Functional Criteria –Voice Frequency Network Channel Terminating Equipment 4–Wire Maintenance Terminating Unit
PUB 43101	Voice Grade Entrance Facilities for Extending Customer – Provided Communications Channels
PUB 43201	Private Line Interconnection Voice Applications
PUB 43701	Private Line Interconnection – Connection to a Channel of a Communications System
PUB 43720	Private Line Interconnection – Operational Features of Bell System Switch Terminations

PUB 43801	Digital Channel Bank – Requirements and Objectives
PUB 43804	Network Terminal Equipment Operations Interface Specification
PUB 62103	High Performance Data Conditioning – Type D5 for Multi–Point Private Line Data Channels
PUB 62113	Network Channel Interface Specifications for Off–Premises Station Lines (PBX End) Facility Interface Codes OL13A, OL13B, and OL13C
PUB 62114	Network Channel Interface Specifications for Tie Trunk–like Channel's Accumulating Four Wire Lossless Registered Terminal Equipment That Originates on M–Lead Facility Interface Codes TL31M and TL32M
PUB 62115	Network Channel Interface Specifications for Tie Trunk–like Channel's Accumulating Four Wire Lossless Registered Terminal Equipment That Originates on E–Lead Facility Interface Codes TL31E and TL32E
PUB 62200	Group and Super Group Spectra + Description and Interface Specification
PUB 62310	Digital Data System Channel Interface Specification
PUB 62411	High Capacity Digital Service Channel Interface Specification Preliminary

BELLCORE Technical References

TA–NPL–000342	High–capacity Digital Special Access Service Transmission Parameter Limits and Interface Combinations
TR–NPL–000334	Voice Grade Switched Access Service Transmission Parameter Limits and Interface Combinations
TR–NPL–000335	Voice Grade Special Access Service Transmission Parameter Limits and Interface Combinations
TR–NPL–0000336	Metallic and Telegraph Grade Special Access Service Transmission Parameter Limits and Interface Combinations
TR–NPL–000337	Program Audio Special Access Service Transmission Parameter Limits and Interface Combinations
TR–NPL–000338	Television Special Access and Local Channel Services – Transmission Parameter Limits and Interface Combinations

TR–NPL–000339	Wideband Analog Special Access Service Transmission Parameter Limits and Interface Combinations
TR–NPL–000340	Wideband Data Special Access Service Transmission Parameter Limits and Interface Combinations
TR–NPL–000341	Digital Data Special Access Service Transmission Parameter Limits and Interface Combinations
TR–NPL–000342	High–capacity Digital Special Access Service Transmission Parameter Limits and Interface Combinations
TR–TSY–000007	Voice Frequency Network Channel Terminating Equipment – Metallic Facilities
TR–TSY–000009	Asynchronous Digital Multiplexes – Requirements and Objectives
TR–TSY–000475	Operations Technology Generic Requirements (OTGR): Network Maintenance Transport Surveillance, Section 5

American National Standards Institute (ANSI)

X3.63	General, Physical and Magnetic Requirements for Unrecorded Twelve–Disk Pack (100 Megabytes)

Institute of Electrical and Electronic Engineers (IEEE)

ANSI/IEEE–STD–743	Standard Methods and Equipment for Measuring the Transmission Characteristics of Analog Voice Frequency Circuits.
ANSI/IEEE–802.2	Logical Link Control
ANSI/IEEE–802.3	Local Area Networks Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications
ANSI/IEEE–802.4	Token Passing Bus Access Method and Physical Layer Specifications
ANSI/IEEE–802.5	Local Area Networks, Token Ring Access Method

International Civil Aviation Organization (ICAO)

Annex 10, Volume I and II	Aeronautical Telecommunications

International Organization for Standardization (ISO)

ISO 2110:1989	Information Technology – Data Communication– 25–Pin Data Terminal Equipment (DTE) and Data Circuit–Terminating Equipment (DCE) Interface Connector and Contact Number Assignments, 3rd Edition
ISO 3309:1991	Information Processing Systems – Data Communication – High–Level Data Link Control Procedures – Frame Structure, 4th Edition
ISO 4335:1987	Information Processing Systems – Data Communication – High–level Data Link Control Elements of Procedures, 3rd Edition
ISO 7498:1984	Information Processing Systems – Open Systems Interconnection – Part 1: Basic Reference Model, 1st Edition
ISO 7809:1984	Information Processing Systems – Data Communication – High–level Data Link Control Procedures – Consolidation of Classes of Procedures, 1st Edition

International Telephone and Telegraph Consultative Committee (CCITT)

CCITT V.24	List of Definitions for Interchange Circuits Between Data Terminal Equipment and Data Circuit–Terminating Equipment
CCITT V.28	Electrical Characteristics for Unbalanced Double–Current Interchange Circuits

Electronic Industries Association (EIA)

RS–232C	Interface Between Data Terminal Equipment and Data Circuit–Terminating Equipment Employing Serial Binary Data Interchange
EIA–232D/E	Interface Between Data Terminal Equipment and Data Circuit–Terminating Equipment Employing Serial Binary Data Interchange
EIA–422 and Appendix	Electrical Characteristics of Balanced Voltage Digital Interface Circuits
EIA–423 and Appendix	Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits
EIA–464	Private Branch Exchange (PBX) Switching Equipment for Voice Bank Applications
EIA–470	Telephone Instruments, with Loop Signalling for Voice Band Applications

EIA–496	Interface Between Data Circuit Equipment (DCE) and the Public Switched Telephone Network (PSTN)
EIA–530	High Speed 25–Position Interface for Data Terminal Equipment and Data Circuit Terminating Equipment

Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using federal agencies.

3. REQUIREMENTS

3.1 General. The FAA telecommunication standards activity covered by this document is a result of standardization efforts taking place external to the agency. The standards appropriate to FAA systems, services, and equipment have been selected from data, voice, and transmission standards developed or implemented by the following organizations or groups: American National Standards Institute (ANSI), General Services Administration (GSA), International Organization for Standardization (ISO), International Telephone and Telegraph Consultive Committee (CCITT), National Institute of Standards and Technology (NIST), American Telephone and Telegraph (AT&T), Electronic Industry Association (EIA), Federal Communications Commission (FCC), Institute of Electrical and Electronic Engineers (IEEE), Bell Communications Research (Bellcore), and the International Civil Aviation Organization (ICAO). A Federal Information Processing Standard Publication (FIPS PUB) may reference a technical standard adopted by ANSI. A Federal Standard (FED–STD) refers to a technical standard adopted by the Federal Telecommunications Standards Program. Careful selection and application of these standards will allow agency systems to evolve more efficient interfaces as well as meet transition and interoperability requirements. The FAA telecommunications standards activity must therefore be tightly controlled during the planning and upgrading process for National Airspace System (NAS) and agency support systems identified in the Information Resource Management Plan. The standards selected for the FAA are from three categories:

a. Mandatory standards are those imposed by a U.S. authority on government systems and equipment. The FAA is required to use mandatory standards to meet its requirements. However, imposing mandatory standards does not preclude the FAA from applying its own standards or other voluntary standards to satisfy a particular requirement if there is not an equivalent "Federal" standard available.

b. Treaty standards are international standards such as those imposed by CCITT, ICAO, or regulatory bodies.

c. Voluntary Standards are standards which are highly desirable for interoperability and system cost avoidance purposes. Certain voluntary standards, such as those agreed to by EIA and others, have been, or soon may be, adopted as mandatory by the U.S. Government.

3.2 Data communications. This subsection details the basic information necessary to describe relevant communications standards. Information is provided concerning the purpose of the document, its applicability, provisions for waivers, and technical requirements portion of the solicitation wording. A description in summary form of the features or parameters of the data communications standards, selection criteria, and an inventory of essential technical characteristics of each standard are included where appropriate.

3.2.1 Parameters and selection criteria.

3.2.1.1 Interchange codes and data storage media.

3.2.1.1.1 FIPS PUB 1–2: Code for Information Interchange, Its Representations, Subsets, and Extensions. FIPS PUB 1–2 is a mandatory standard and shall be used to promulgate ASCII code and specifies the code and character set for use in Federal information processing systems, communications systems, and associated equipment. It is used in conjunction with FIPS PUB 2–1 and FIPS PUB 3–1.

3.2.1.1.1.1 Applicability. The standard shall be applicable to all computer and related equipment configurations brought into the federal inventory, acquired or leased with federal funds. It also applies to data systems developed at government expense, if such data is to be a part of the data base of a federal agency. "Related equipment" includes all character–oriented equipment in which magnetic tape, perforated tape, or flexible disk is produced for input to a computer–based data system or received as output from a computer based data system.

3.2.1.1.1.2 Waivers. Waivers to this standard shall be obtained from the administrator.

3.2.1.1.1.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "The system, upon receiving a hardware or software command, shall accept data on magnetic tape, paper tape, or any other input media covered by an approved FIPS PUB in ASCII code and collating sequence prescribed in FIPS PUB 1–2 and in the format prescribed in FIPS PUBS 2–1, 3–1, 25, 50, or other applicable FIPS PUBs. Such data shall be translated, if necessary, into a form that the proposed equipment can internally process, provided that, upon receiving a hardware or software command, the proposed equipment can produce processed data on magnetic tape, paper tape, and other output media in the ASCII code and collating sequence prescribed in FIPS PUB 1–2 and in the format prescribed in FIPS PUBs 2–1, 3–1, 25, 50, or other applicable FIPS PUBs."

3.2.1.1.2 FIPS PUB 2–1: Perforated Tape Code for Information Interchange. FIPS PUB 2–1 is a mandatory standard and shall be used to specify the representation of ASCII (FIPS PUB 1–2) on perforated tape used in federal information processing systems, communications systems and associated equipments.

3.2.1.1.2.1 Applicability. The standard shall be applicable to punched paper tape equipment.

3.2.1.1.2.2 Waivers. Waivers to this standard shall be obtained from the administrator.

3.2.1.1.2.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "Punched paper tape equipment shall be capable of reading and punching in the prescribed ASCII code and format specified in FIPS PUB 1–2 and FIPS PUB 2–1."

3.2.1.1.3 FIPS PUB 3–1: Recorded Magnetic Tape for Information Interchange (800 CPI, NRZI). FIPS PUB 3–1 is a mandatory standard and shall be used to specify the recorded characteristics of 9–track one–half inch wide magnetic computer tape, and the data format for implementing ASCII code at the recording density of 800 characters per inch (CPI) on magnetic tape media.

3.2.1.1.3.1 Applicability. The standard shall be applicable to all 9–track digital magnetic tape recording equipment employing one–half inch wide tape at a recording density of 800 CPI.

3.2.1.1.3.2 Waivers. Waivers to this standard shall be obtained from the administrator.

3.2.1.1.3.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All 9–track digital magnetic tape recording and reproducing equipment resulting from this solicitation employing 1/2 inch–wide tape at the recording density of 800 CPI including associated programs shall provide the capability to accept and generate recorded tapes in compliance with the requirements set forth in FIPS PUB 3–1."

3.2.1.1.4 FIPS PUB 25: Recorded Magnetic Tape for Information Interchange (1600 CPI, Phase Encoded). FIPS PUB 25 is a mandatory standard and shall be used to specify the recorded characteristics of 9–track, digital one–half inch wide magnetic computer tape, including the data format for implementing the American Standard Code for Information Interchange at the recording density of 1600 CPI.

3.2.1.1.4.1 Applicability. The standard shall be applicable to all 9–track magnetic tape recording and reproducing equipments employing one–half inch wide tape at recording densities of 1600 CPI.

3.2.1.1.4.2 Waivers. Waivers to this standard shall be obtained from the administrator after coordination with the National Institute of Standards and Technology.

3.2.1.1.4.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All 9–track digital magnetic tape recording and reproducing equipment resulting from this solicitation and employing 1/2–inch wide tape at the recording density of 1600 CPI (phase encoded), including associated programs, shall provide the capability to accept and generate recorded tapes in compliance with the requirements set forth in FIPS PUB 25."

3.2.1.1.5 FIPS PUB 50: Recorded Magnetic Tape for Information Interchange, 6250 CPI (246 cpmm), Group Coded Recording. FIPS PUB 50 is a mandatory standard and shall be used to specify the recorded characteristics of 9–track one–half inch (12.7 mm) wide magnetic computer tape, including the format for implementing ASCII code at the recording density of 6250 CPI (246 characters per millimeter (cpmm)).

3.2.1.1.5.1 Applicability. The standard shall be applicable to all 9–track magnetic tape recording and reproducing equipment employing one–half inch (12.7 mm) wide tape at recording densities of 6250 CPI (246 cpmm).

3.2.1.1.5.2 Waiver. Waivers to this standard shall be obtained from the administrator after coordination with the National Institute of Standards and Technology.

3.2.1.1.5.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All applicable digital magnetic tape recording and reproducing equipment which results from this solicitation and employs 1/2–inch wide (12.7 mm) magnetic computer tape at the recording density of 6250 characters per inch (246 characters per millimeter) group–coded recording, including associated programs shall provide the capability to accept and generate recorded tape in compliance with the requirements set forth in FIPS PUB 50."

3.2.1.1.6 FIPS PUB 52: Recorded Magnetic Tape Cartridge for Information Interchange, 14 Track, 6.30 mm (1/4 inch), 63 bpmm (1600 bpi) Phase Encoded. FIPS PUB 52 is a mandatory standard and shall be used to specify the recorded characteristics for a 6.30 mm (1/4 in) wide magnetic tape cartridge with either one, two or four serial data tracks in order to provide for data interchange between information processing systems, communication systems, and associated equipment at a recording density of 63 bits per millimeter (1600 bits per inch) using phase encoding techniques.

3.2.1.1.6.1 Applicability. The standard shall be applicable to all magnetic tape cartridge rewording and reproducing equipment.

3.2.1.1.6.2 Waivers. Waivers to this standard shall be obtained from the administrator.

3.2.1.1.6.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All magnetic tape cartridge recording and reproducing equipment which results from this solicitation and employs 6.30 millimeter (.250 inch) wide magnetic tape with one, two, or four independent serial data tracks at recording densities of 63 bits per millimeter (1600 bits per inch) using phase encoding techniques, including associated software, shall provide the capability to accept and generate recorded magnetic tape cartridges in the code an format as specified in FIPS PUB 1–2 and FIPS PUB 52."

3.2.1.1.7 FIPS PUB 86: Additional Controls for Use with American National Standard Code for Information Interchange. FIPS PUB 86 is a mandatory standard and shall be used to specify a set of encoded control functions to facilitate data interchange between Automated Data Processing (ADP)/data communication equipment and two–dimensional character–imagining I/O devices. These control functions augment the basic set of control functions prescribed by FIPS PUB 1–2.

3.2.1.1.7.1 Applicability. The standard shall be applicable to all ADP equipment and services that involve character imaging and which employ the character set and encoding conventions prescribed by FIPS PUB 1–2.

3.2.1.1.7.2 Waivers. Waivers to this standard shall be obtained from the Secretary of Commerce via the administrator.

3.2.1.1.7.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All applicable ADP character–imaging equipment or services (e.g., interactive ADP terminals of the display and printer type, line printers, microfilm printers, typesetting composers, word processors, and related devices or services using such devices) offered as a result of the requirements of which this is a part shall comply with the requirements set forth in FIPS PUB 86 when such equipment or services employ the character set and encoding conventions prescribed in FIPS PUB 1–2, employ primarily character–oriented controls, and are consistent with the architectural assumptions for devices in Appendix B, ANSI X3.63. All ADP terminals that meet these conditions are included in this requirement if they contain alphanumeric keyboards and CRT displays or printers that may be used in any form of on–line interactive application or stand–alone off–line data preparation. Computer resident control software may be used, but is not required, to implement specific features of FIPS PUB 86, unless specified otherwise in this document."

3.2.1.2 Data Transmission.

3.2.1.2.1 FIPS PUB 16–1: Bit Sequencing of the Code for Information Interchange in Serial–by–bit Data Transmission. FIPS PUB 16–1 is a mandatory standard and shall be used to specify the method of transmitting ASCII code. FIPS PUB 16–1 is a joint standard with FED–STD–1010.

3.2.1.2.1.1 Applicability. The standard shall be applicable to equipment or services transmitting an approved Standard Code in a serial–by–bit, serial–by–character stream form at the interface between data terminal equipment and data communications equipment.

3.2.1.2.1.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.1.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All applicable equipment or services that may result from this solicitation, transmitting in a serial–by–bit, serial–by–character mode, shall be capable of bit sequencing as prescribed in FIPS PUB 16–1/FED–STD–1010 for the transmission of the Standard Code for Information Interchange, FIPS PUB 1–2, at the interface between data terminal equipment and data communication equipment."

3.2.1.2.2 FIPS PUB 17–1: Character Structure and Character Parity Sense for Serial–by–bit Data Communication in the Code for Information Interchange. FIPS PUB 17–1 is a mandatory standard and shall be used to specify the method of transmitting ASCII code, FIPS PUB 1–2, in the serial–by–bit, serial–by–character data transmission. FIPS PUB 17–1 is a joint standard with FED–STD–1011.

3.2.1.2.2.1 Applicability. The standard shall be applicable to equipment or services transmitting ASCII code (FIPS PUB 1–2) in a serial–by–bit, serial–by–character synchronous or asynchronous mode.

3.2.1.2.2.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via administrator,.

3.2.1.2.2.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All applicable equipment that may result from this solicitation, transmitting in a serial–by–bit, serial–by–character synchronous or asynchronous mode, shall be capable of transmitting the character structure and sense of character parity prescribed in FIPS PUB 17–1/FED–STD–1011 for the transmission of the Standard Code for Information Interchange, FIPS PUB 1–2, at the interface between data terminal equipment and data communication equipment."

3.2.1.2.3 FIPS PUB 18–1: Character Structure and Character Parity Sense for Parallel–by–bit Data Communication in the Code for Information Interchange. FIPS PUB 18–1 is a mandatory standard and shall be used to specify the channel assignment for transmitting the Standard Code for Information interchange, FIPS PUB 1–2, in parallel–by–bit, serial–by–character data transmission. FIPS PUB 18–1 is a joint standard with FED–STD–1012.

3.2.1.2.3.1 Applicability. The standard shall be applicable to equipment or services transmitting ASCII code (FIPS PUB 1–2) in a parallel–by–bit, serial–by–character mode.

3.2.1.2.3.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via administrator.

3.2.1.2.3.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All applicable equipment or services that may result from this solicitation, transmitting in a parallel–by–bit, serial–by–character mode, shall be capable of transmitting the character structure and sense of character parity prescribed in FIPS PUB 18–1/FED–STD–1012, when transmitting the Standard Code for Information Interchange, FIPS PUB 1–2, at the interface between data terminal equipment and data communication equipment."

3.2.1.2.4 FIPS PUB 22–1: Synchronous Signaling Rates between Data Terminal and Data Communication Equipment. FIPS PUB 22–1 is a mandatory standard and shall be used to specify the rates of transferring binary encoded information in synchronous serial or parallel form between data processing terminal and data communication equipment that employ voice grade communication facilities. FIPS PUB 22–1 is a joint standard with FED–STD–1013.

3.2.1.2.4.1 Applicability. The standard shall be applicable to equipment and services used in connection with synchronous data communication equipment operating on binary encoded information in serial or parallel fashion over voice grade communication channels of nominal 4 kilohertz (kHz) bandwidth.

3.2.1.2.4.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator

3.2.1.2.4.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All applicable equipment or services resulting from this solicitation that are employed in conjunction with synchronous data communication equipment designed to operate on binary encoded information in either serial or parallel fashion over voice grade communication channels of nominal 4kHz bandwidth shall comply with FIPS PUB 22–1/FED–STD–1013."

3.2.1.2.5 EIA–232E: Low Speed 25–Pin Interface for Data Terminal Equipment and Data Circuit–Terminating Equipment. EIA–232E is a revision of RS–232C and EIA–232D, which brings it in–line with international standards CCITT V.24, V.28, and ISO 2110. It also includes the specification for a 25–pin interface connector and adds local loopback, remote loopback, and test mode interchange circuits. A shield has been added, the protective ground has been redefined, and some terminology has been changed.

EIA–232E may be used to specify the interconnection of data communication of data terminal equipment (DTE) and data circuit–terminating equipment (DCE) employing serial binary data interchange over unbalanced voltage digital interface circuits. This standard defines the signal characteristics, interface mechanical characteristics, functional description of interchange circuits, and standard interfaces for selected communication system configurations. EIA–232E is compatible with the electrical characteristics of EIA–232D, but not with EIA–530. EIA–232E is compatible with the electrical characteristics of RS–232C, but has additional functionality.

3.2.1.2.5.1 Applicability. This standard shall be applicable for communications equipment with applications requiring use of dial–up or secondary signals and employing low speed (zero to 20,000 bits per second) interchange between DTEs and DCEs.

3.2.1.2.5.2 Waiver. Not applicable.

3.2.1.2.5.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All telecommunication equipment, with applications requiring use of either dial–up or secondary signals and using zero to 20,000 bits per second interchange between DCEs and DTEs, that is offered as a result of this solicitation shall comply with the electrical, mechanical, and functional characteristics addressed by EIA–232D."

3.2.1.2.6 Deleted.

3.2.1.2.7 FIPS PUB 107: Local Area Networks: Baseband Carrier Sense Multiple Access with Collision Detection Access Method and Physical Layer Specifications and Link Layer Protocol. FIPS PUB 107 is a mandatory standard and shall be used to provide the mechanical, electrical, functional and procedural specifications and the link protocol required to establish physical connections, to transmit bits and to send data link frames between nodes.

3.2.1.2.7.1 Applicability. The standard shall be applicable to all federal departments and agencies which require compatibility with voluntary industry standards for both public and private data communications networks.

3.2.1.2.7.2 Waivers. Waivers to this standard shall be obtained from the administrator.

3.2.1.2.7.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All local area network services and equipment employing CSMA/CD (ANSI/IEEE STD 802.3) which result from this requirement shall provide the capability to transmit bits and to send data link frames between nodes in compliance with the requirements set forth in FIPS PUB 107."

3.2.1.2.8 Deleted.

3.2.1.2.9 FED–STD–1005: Coding and Modulation Requirements for 2400 Bit/Second Modems. FED–STD–1005 is a mandatory standard and shall be used to establish the coding and modulation requirements for 2400 bit/second modems owned or leased by the federal government for use over analog transmission channels other than those derived from high–frequency radio facilities.

3.2.1.2.9.1 Applicability. The standard shall be applicable to 2400 bit/second modems for use with nominal 4kHz channels derived from either switched networks or dedicated lines. It provides for split channel (full duplex) operation on switched circuits.

3.2.1.2.9.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.9.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All 2400 bits/second modems that are offered as a result of this solicitation for use with 4kHz channels derived from either switched networks or dedicated lines shall comply with FED–STD–1005."

3.2.1.2.10 FED–STD 1006: Coding and Modulation Requirements for 4800 Bit/Second Modems. FED–STD–1006 is a mandatory standard and shall be used to establish the coding and modulation requirements for 4800 bits/second modems owned or leased by the federal government for use over analog transmission channels.

3.2.1.2.10.1 Applicability. The standard shall be applicable to 4800 bits/second modems (and equipment containing modems) for use with nominal 4kHz analog channels.

3.2.1.2.10.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.10.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All 4800 bits/second modems (and equipment containing 4800 bits/second modems) offered as result of this solicitation for use with nominal 4kHz analog channels shall comply with FED–STD–1006."

3.2.1.2.11 FED–STD–1007: Coding and Modulation Requirements for Duplex 9600 Bit/Second Modems. FED–STD–1007 is a mandatory standard and shall be used to establish coding and modulation requirements for duplex 9600 bits/second modems owned or leased by the federal government for use over analog transmission channels terminated by four–wire" circuits.

3.2.1.2.11.1 Applicability. The standard shall be applicable to duplex 9600 bits/second modems (and equipment containing such modems) for use over nominal 4kHz analog channels terminated by four–wire" circuits.

3.2.1.2.11.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.11.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All duplex 9600 bits/second modems offered as a result of this solicitation for use with nominal 4kHz analog transmission channels shall comply with FED–STD–1007."

3.2.1.2.12 FED–STD–1008: Coding and Modulation Requirements for Duplex 600 and 1200 Bit/Second Modems. FED–STD–1008 is a mandatory standard and shall be used to establish coding and modulation requirements for duplex 600 bits/second and 1200 bits/second modems owned or leased by the federal government for use over analog transmission channels terminated by "two–wire" circuits.

3.2.1.2.12.1 Applicability. The standard shall be applicable to duplex 600 bit/second modems and/or 1200 bits/second modems (and equipment containing such modems) for use over nominal 4kHz analog channels terminated by "two–wire" circuits not acoustically coupled to telephone instruments.

3.2.1.2.12.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.12.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All two–wire duplex 600 bits/second and/or 1200 bits/second modems (except those to be acoustically coupled to telephone instruments) offered as a result of this solicitation for use with nominal 4kHz analog channels shall comply with FED–STD–1008."

3.2.1.2.13 FED–STD–1020: Electrical Characteristics of Balanced Voltage Digital Interface Circuits. FED–STD–1020 is a mandatory standard and shall be used to specify the electrical characteristics of balanced voltage digital interface circuits normally implemented in integrated circuit technology that are to be employed for the interchange of serial binary data, timing, and control signals between voice or data telecommunication equipment where information is being conveyed at the base band level at data signaling rates up to 10 megabits per second (Mb/s). This standard adopts the requirements of EIA–RS–422.

3.2.1.2.13.1 Applicability. The standard shall be applicable to equipment employing balanced voltage digital interface circuits.

3.2.1.2.13.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.13.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All equipment using balanced voltage digital interface circuits that is offered as a result of this solicitation shall comply with the electrical characteristics addressed by FED–STD–1020."

3.2.1.2.14 FED–STD–1030: Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits. FED–STD–1030 is a mandatory standard and shall be used to specify the electrical characteristics of unbalanced voltage digital interface circuits normally implemented in integrated circuit technology that are to be employed for the interchange of serial binary data, timing, and control signals between voice or data telecommunication equipment where information is being conveyed at the baseband level at data signaling rates up to 100 kilobits per second (kb/s). This standard adopts the requirements of EIA–RS–423.

3.2.1.2.14.1 Applicability. The standard shall be applicable to equipment employing unbalanced voltage digital interface circuits.

3.2.1.2.14.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.14.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All equipment using unbalanced voltage digital interface circuits that is offered as a result of this solicitation shall comply with the electrical characteristics addressed by FED–STD–1030."

3.2.1.2.15 FED–STD–1032: High Speed 25–position Interface for Data Terminal Equipment and Data Circuit–terminating Equipment. FED–STD–1032 is a mandatory standard and shall be used to specify the interconnection of data terminal equipment (DTE) and data circuit–terminating equipment (DCE) employing serial binary data interchange circuits with control information exchanged on separate control circuits. In particular, this standard defines the signal characteristics, interface mechanical characteristics, functional description of interchange circuits, and standard interfaces for selected communication system configurations. The electrical characteristics of the interchange circuits are specified by reference to EIA standards RS–422 (FED–STD–1020) and RS–423 (FED–STD–1030). FED–STD–1032 is a joint standard with FIPS PUB 154. This standard adopts the requirements of EIA–530.

3.2.1.2.15.1 Applicability. The standard shall be applicable to all telecommunication equipment employing high speed (20,000 to 2,000,000 bits/second) interchange between DTEs and DCEs.

3.2.1.2.15.2 Waivers. Waivers to this standard shall be obtained from the administrator.

3.2.1.2.15.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All telecommunication equipment using 20,000 to 2,000,000 bits/second interchange between DCEs and DTEs that is offered as a result of this solicitation shall comply with the electrical, mechanical, and functional characteristics addressed by FED–STD–1032."

3.2.1.2.16 FED–STD–1061: Group 2 Facsimile Apparatus for Document Transmission. FED–STD–1061 is a mandatory standard and shall be used to establish the machine specifications for Group 2 facsimile apparatus used on voiceband analog circuits.

3.2.1.2.16.1 Applicability. The standard shall be applicable to Group 2 facsimile apparatus for use with voiceband analog circuits.

3.2.1.2.16.2 Waivers. Waivers to the standard shall be obtained by the Administrator from the General Services Administration via the administrator.

3.2.1.2.16.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All Group 2 facsimile apparatus offered as a result of this solicitation for use with voiceband analog circuits shall comply with FED–STD–1061."

3.2.1.2.17 FED–STD–1062: Group 3 Facsimile Apparatus for Document Transmission. FED–STD–1062 is a mandatory standard and shall be used to establish the machine specifications for Group 3 facsimile apparatus used over voiceband analog circuits.

3.2.1.2.17.1 Applicability. The standard shall be applicable to Group 3 facsimile apparatus for use over voiceband analog circuits.

3.2.1.2.17.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.17.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All Group 3 facsimile apparatus designed, developed, or offered for use over voice band analog circuits shall comply with FED–STD–1062."

3.2.1.2.18 FED–STD–1063. FED–STD–1063 is a mandatory standard and shall be used to establish the procedures for document facsimile transmission in the general switched telephone network.

3.2.1.2.18.1 Applicability. The standard shall be applicable to facsimile terminals/systems used in the General Switched Telephone Network.

3.2.1.2.18.2 Waivers. Waivers to this standard shall be obtained from the General Services Administration via the administrator.

3.2.1.2.18.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All group 1, 2 and 3 facsimile apparatus designed, developed, or offered for use over voice band analog circuits shall comply with FED–STD–1063."

3.2.1.3 Documentation.

3.2.1.3.1 FIPS PUB 53: Transmittal Form for Computer Magnetic Tape File Properties. FIPS PUB 53 is a mandatory standard and shall be used to provide a standard magnetic tape transmittal form (SF–277), together with instructions for providing the necessary information on the form.

3.2.1.3.1.1 Applicability. The standard shall be applicable to all federal information processing operations requiring documentation of the physical properties and characteristics of a recorded magnetic tape file.

3.2.1.3.1.2 Waivers. Waivers to this standard shall be obtained from the administrator.

3.2.1.3.1.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All magnetic tape used to transmit coded information to the federal government as a result of this solicitation shall include completed Standard Form 277 (SF–277) describing magnetic tape file properties as set forth in FIPS PUB 53."

3.2.1.3.2 FIPS PUB 79: Magnetic Tape Labels and File Structure for Information Interchange. FIPS PUB 79 is a mandatory standard and shall be used to define magnetic tape labels and file structure for information interchange including four levels of labeling, label formats, blocking structure, and tape–mark relationships on magnetically recorded tapes (volumes).

3.2.1.3.2.1 Applicability. The standard shall be applicable to information processing systems using 9–track tape drives for information interchange.

3.2.1.3.2.2 Waivers. Waivers to this standard shall be obtained from the Secretary of Commerce via the administrator.

3.2.1.3.2.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "Information processing systems using nine–track tape drives and new tape label processing facilities that will be part of an information processing system offered as a result of this solicitation shall be capable of generating and processing tape labels and file structures that conform to one of the four levels of FIPS PUB 79 if the information processing system either generates or accepts magnetic tapes for information interchange. Offerors shall specify the level of conformance and certify that a copy of the current users manual is on file with the National Institute of Standards and Technology as required by FIPS PUB 79."

3.2.1.4 Interchange codes, media and data files.

3.2.1.5 General data standards.

3.2.1.5.1 FIPS PUB 58–1: Representation of Local Time of the Day for Information Interchange. FIPS PUB 58–1 is a mandatory standard and shall be used to provide the means for representing the local time of the day based upon both the 12– and 24– hour timekeeping systems for use in the interchange of information among data systems. It specifies the time elements and their sequencing, the use of separators between time elements and the representation of the meridian designator.

3.2.1.5.1.1 Applicability. The standard shall be applicable to all data systems which must use a coded time representation.

3.2.1.5.1.2 Waivers. Waivers to this standard shall be obtained from the Secretary of Commerce via the administrator.

3.2.1.5.1.3 Technical requirements portion of the solicitation. The following wording shall be used in the solicitation: "All data systems requiring the coding of the local time of day shall comply with FIPS PUB 58–1."

3.2.1.5.2 FIPS PUB 59; Representation of Universal Time Differentials and United States Time Zone References for Information. FIPS PUB 59 is a mandatory standard and shall be used to provide the means for representing universal time, local time differentials, and United States time zone